

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application.

1. (Currently amended) A method for dynamically establishing an ad-hoc network including a plurality of machines, one or more of which may move within an environment and each of which includes a gateway, the method performed by a respective gateway included within a respective one of the machines and comprising:

determining identifying a first set sub-network of the plurality of machines that are within direct communication range of the respective machine and each other based on the respective machine's current location within the environment;

storing, by the respective machine, information identifying and associating each of the machines in the first sub-network;

determining identifying a second set sub-network of the plurality of machines that are in direct communication range of one or more of the machines in the first set sub network and each other, the second sub-network including at least one machine not included in the first sub-network;

storing, by the respective machine, information identifying and associating each of the machines in the second sub-network;

forwarding a packet received from a first machine included in the first set sub-network to a second machine included in the first set sub-network based on a determination that the second machine is either directly or indirectly within communication range of a third machine included in the second sub-network set; and

updating a computer readable storage device the stored information
identifying and associating [[of]] the machines included in at least one of the first and
second sets sub-networks of the plurality of machines based on at least one of:
(i) the respective machine changing locations within the
environment, and
(ii) any of the machines included in the first or second sets sub-
networks changing locations within the environment.

2. (Currently amended) The method of claim 1, wherein the packet is
destined for a destination machine not included in the first or second sets sub-networks
of the plurality of machines, and forwarding the packet includes:

forwarding the packet to the second machine based on a determination
that the third machine is in direct communication range of the destination machine.

3. (Currently amended) The method of claim 1, wherein the packet is
destined for a destination machine not included in the first or second sets sub-networks
of the plurality of machines, and forwarding the packet includes:

forwarding the packet to the second machine based on a determination
that the third machine can indirectly communicate with the destination machine.

4. (Currently amended) The method of claim 1, wherein determining
identifying the first set sub-network of the plurality of machines includes:
broadcasting an admission packet;

receiving a response from at least one of the first and second machines;
and

adding at least one of the first and second machines to the first set sub-network of the plurality of machines based on the received response.

5. (Currently amended) The method of claim 4, wherein determining identifying the second set sub-network of the plurality of machines includes:
collecting, from the response, an identifier associated with the third machine; and

adding the third machine to the second set sub-network of the plurality of machines, wherein the identifier reflects that at least one of the first and second machines are either directly or indirectly in communication with the third machine.

6. (Currently amended) The method of claim 1, wherein updating the stored information identifying and associating the machines included in the at least one of the first and second sets sub-networks of the plurality of machines further includes:
determining that the respective machine has moved to a first location; and
repeating the determining of the first set sub-network of the plurality of machines when the first location is beyond a certain distance from the current location.

7. (Currently amended) The method of claim 1, wherein updating the stored information identifying and associating the machines included in the at least one of the first and second sets sub-networks of the plurality of machines further includes:

periodically repeating the step of determining the first set sub-network of the plurality of machines.

8. (Currently amended) The method of claim 1, wherein updating the stored information identifying and associating the machines included in the ~~at least one~~ of the first and second sets sub-networks of the plurality of machines further includes:

removing from the first set sub-network any machines that are not in direct communication with the respective machine.

9. (Currently amended) The method of claim 8, wherein updating the stored information identifying and associating the machines included in the ~~at least one~~ of the first and second sets sub-networks of the plurality of machines further includes:

removing from the second set sub-networks any machines that are not in direct communications with any machines included in the first set.

10. (Previously presented) The method of claim 1, wherein the respective machine is connected to at least two data links capable of transmitting the packet from the respective machine and forwarding the packet further includes:

selecting one of the at least two data links to forward the packet to the first machine based on at least one of an availability status of each of the data links, a cost of communicating over each data link, a quality of service associated with each data link, a priority of the packet, and a transmission time associated with each data link.

11. (Currently amended) The method of claim 1, wherein the packet is destined for a destination machine and the respective gateway includes a first network

table, the first network table containing the information identifying and associating each of the machines in the first sub-network and information identifying machines in the second sub-network that are within direct communication range of machines in the first sub-network, and forwarding the packet includes:

forwarding the packet to the second machine based on a determination that the second machine is associated with the destination machine in the first network table.

12. (Currently amended) The method of claim 1, wherein the packet is destined for a destination machine and the respective gateway includes a first and a second network table, wherein:

the first network table contains the information identifying and associating each of the machines in the first sub-network and information identifying machines in the second sub-network that are in direct communication range of machines in the first sub-network;

the second network table contains the information identifying and associating each of the machines in the second sub-network and information identifying machines in neither of the first and second sub-networks that are in direct communication range of machines in the second sub-network; and

forwarding the packet includes[:]] forwarding the packet to the second machine based on a determination that the destination machine is associated with the third machine in the second network table and the third machine is associated with the second machine in the first network table.

13. (Currently amended) A system for dynamically establishing communications between a plurality of machines, one or more of which may move within an environment, the system comprising:

a first machine positioned in a first location within the environment;
a first gateway included in the first machine that connects an on-board data link with an off-board data link; and
a network table included in the first gateway that identifies machines that are either directly or indirectly within communication range of the first machine, wherein the network table identifies contains:

information identifying and associating a first sub-network set of the plurality of machines that are within direct communication range of the first machine and each other, and

information identifying identifies a second set sub-network of the plurality of machines that are within direct communication range of any of at least one of the machines in the first set sub-network and each other, the second sub-network including at least one machine not included in the first sub-network,

wherein the first gateway is configured to:

update the network table based on at least one of (i) the first machine changing locations within the environment and (ii) any of the machines included in the first or second sets sub-networks changing locations within the environment,

receive a packet over the off-board data link from a second machine included in the first set sub-network, wherein the packet identifies a destination machine,

forward the received packet to a third machine included in the first set sub-network based on a determination that the destination machine is associated with the third machine in the network table, and

send information included in the received packet to the on-board data link when the packet identifies the first machine as the destination machine.

14. (Currently amended) The system of claim 13, wherein the first gateway is configured to update the machines included in the at least one of the first and second ~~sets of the plurality of machines~~ sub-networks identified in the network table based on at least one of (i) the first machine moving out of communication range of any machine in the first set sub-network, (ii) any one of the machines included in the first set sub-network moving out of communication range of the first machine, (iii) any one of the machines in the first set sub-network moving out of communication range of any one of the machines in the second set sub-network, and (iv) any of the machines in the second set sub-network moving out of communication range of any one of the machines in the first set sub-network.

15. (Currently amended) The system of claim 13, wherein the network table includes a first level table identifying the first and second ~~set of the plurality of machines~~ sub-networks and a second level table identifying a third set sub-network of the plurality

of machines that are within communication range of any of the machines in the second set sub-network, and wherein the first gateway is further configured to:

forward the packet to the third machine based on a determination that the destination machine is associated with a fourth machine included in the third set sub-network and the third machine is associated with the fourth machine in the second level table.

16. (Currently amended) The system of claim 13, wherein the first gateway is further configured to:

broadcast an admission packet;
receive a response from at least one of the second and third machines;
and
add at least one of the second and third machines to the first set sub-network of the plurality of machines based on the received response.

17. (Previously presented) The system of claim 13, wherein the first gateway is further configured to:

periodically broadcast an admission packet to determine whether the first machine is within communication range of any of the machines in the environment.

18. (Currently amended) The system of claim 17, wherein the first gateway is further configured to:

remove a machine from the first set sub-network when the first machine can no longer directly communicate with that machine.

19. (Currently amended) The system of claim 17, wherein the first gateway is further configured to:

remove a machine from the second set sub-network when the machine can no longer directly or indirectly communicate with the destination machine.

20. (Previously presented) The system of claim 13, wherein the first machine is connected to at least two data links capable of transmitting the packet from the first machine and the first gateway is further configured to:

select one of the at least two data links to forward the packet to the third machine based on at least one of an availability status of each of the data links, a cost of communicating over each data link, a quality of service associated with each data link, a priority of the packet, and a transmission time associated with each data link.

21. (Previously presented) The system of claim 13, wherein the first gateway is further configured to:

translate the information included in the received packet to a format compatible with the on-board data link when the packet identifies the first machine as the destination machine.

22. (Previously presented) The system of claim 13, wherein the third machine includes a respective gateway that is configured to check a respective network table to identify a fourth machine that is either directly or indirectly in communication with the destination machine and forward the packet received from the first machine to the fourth machine.

23. (Previously presented) The system of claim 13, wherein the first gateway is configured to:

trace the network table to determine the association between the third machine and the destination machine.

24. (Previously presented) The system of claim 23, wherein the association between the third machine and destination machine includes an intermediate machine that is in direct communication with the third and destination machines.

25. (Canceled)

26. (Currently amended) A computer-readable storage device including instructions for performing, when executed by a processor, a method for dynamically establishing an ad-hoc network including a plurality of machines, one or more of which move within an environment and each of which includes a gateway, the method performed by a respective gateway included within a respective one of the machines and comprising:

determining identifying a first set sub-network of the plurality of machines that are within direct communication range of the respective machine and each other based on the respective machine's current location within the environment;

storing, by the respective machine, information identifying and associating each of the machines in the first sub-network;

determining identifying a second set sub-network of the plurality of machines that are in direct communication range of one or more of the machines in the

first set sub-network and each other, the second sub-network including at least one machine not included in the first sub-network;

storing, by the respective machine, information identifying and associating each of the machines in the second sub-network;

forwarding a packet received from a first machine included in the first set sub-network to a second machine included in the first set sub-network based on a determination that the second machine is either directly or indirectly within communication range of a third machine included the second set sub-network; and

updating the stored information identifying and associating the machines included in at least one of the first and second sets sub-networks of the plurality of machines based on at least one of:

(i) the respective machine changing locations within the environment, and

(ii) any of the machines included in the first or second sets sub-networks changing locations within the environment.

27. (Currently amended) The computer-readable storage device of claim 26, wherein the packet is destined for a destination machine not included in the first or second sets sub-networks of the plurality of machines, and forwarding the packet includes:

forwarding the packet to the second machine based on a determination that the third machine is in direct communication range of the destination machine.

28. (Currently amended) The computer-readable storage device of claim 26, wherein the packet is destined for a destination machine not included in the first or second sets sub-networks of the plurality of machines, and forwarding the packet includes:

forwarding the packet to the second machine based on a determination that the third machine can indirectly communicate with the destination machine.

29. (Currently amended) The computer-readable storage device of claim 26, wherein determining the first set sub-network of the plurality of machines includes:

broadcasting an admission packet;
receiving a response from at least one of the first and second machines;
and

adding at least one of the first and second machines to the first set sub-network of the plurality of machines based on the received response.

30. (Currently amended) The computer-readable storage device of claim 29, wherein determining the second set sub-network of the plurality of machines includes:

collecting, from the response, an identifier associated with the third machine; and
adding the third machine to the second set sub-network of the plurality of machines, wherein the identifier reflects that at least one of the first and second machines are either directly or indirectly in communication with the third machine.

31. (Currently amended) The computer-readable storage device of claim 26, wherein updating the stored information identifying and associating machines included in the ~~at least one~~ of the first and second sets sub-networks of the plurality of machines further includes:

determining that the respective machine has moved to a first location; and
repeating the determining of the first set sub-network of the plurality of machines when the first location is beyond a certain distance from the respective machine's current location.

32. (Currently amended) The computer-readable storage device of claim 26, wherein updating the stored information identifying and associating machines included in the ~~at least one~~ of the first and second sets sub-networks of the plurality of machines further includes:

periodically repeating the step of determining the first set sub-network of the plurality of machines.

33. (Currently amended) The computer-readable storage device of claim 26, wherein updating the machines included in the at least one of the first and second sets sub-networks of the plurality of machines further includes:

removing from the first set sub-networks any machines that are not in direct communication with the respective machine.

34. (Currently amended) The computer-readable storage device of claim 33, wherein updating the stored information identifying and associating machines included

in at least one of the first and second sets sub-networks of the plurality of machines further includes:

removing from the second set sub-network any machines that are not in direct communications with any machines included in the first set sub-network.

35. (Previously presented) The computer-readable storage device of claim 26, wherein the respective machine is connected to at least two data links capable of transmitting the packet from the respective machine and forwarding the packet further includes:

selecting one of the at least two data links to forward the packet to the first machine based on at least one of an availability status of each of the data links, a cost of communicating over each data link, a quality of service associated with each data link, a priority of the packet, and a transmission time associated with each data link.

36. (Currently amended) The computer-readable storage device of claim 26, wherein the packet is destined for a destination machine and the respective gateway includes a first network table, the first network table containing the information identifying and associating each of the machines in the first sub-network and information identifying machines in the second sub-network that are within direct communication range of machines in the first sub-network, and forwarding the packet includes:

forwarding the packet to the second machine based on a determination that the second machine is associated with the destination machine in the first network table.

37. (Currently amended) The computer-readable storage device of claim 26, wherein the packet is destined for a destination machine and the respective gateway includes a first and second network table, wherein:

the first network table contains the information identifying and associating each of the machines in the first sub-network and information identifying machines in the second sub-network that are in direct communication range of machines in the first sub-network; and

the second network table contains the information identifying and associating each of the machines in the second sub-network and information identifying machines in neither of the first and second sub-network that are in direct communication range of machines in the second sub-network; and

wherein forwarding the packet includes[[::]] forwarding the packet to the second machine based on a determination that the destination machine is associated with the third machine in the second network table and the third machine is associated with the second machine in the first network table.

38. (Currently amended) A method for dynamically establishing an ad-hoc network including a plurality of machines, one or more of which may move within an environment and each of which includes a gateway, the method performed by a respective gateway included within a respective one of the machines and comprising:

determining identifying a first set sub-network of the plurality of machines that are within direct communication range of the respective machine and each other based on the respective machine's current location within the environment;

storing, by the respective machine, information identifying and associating each of the machines in the first sub-network;

determining identifying a second set sub-network of the plurality of machines that are in direct communication range of one or more of the machines in the first set sub-network and each other, the second sub-network including at least one machine not included in the first sub-network; and

forwarding a packet to a computer-readable storage device of a second machine included in the first set sub-network based on a determination that the second machine is either directly or indirectly within communication range of a third machine included the second set sub-network, wherein the packet is either (i) received from a first machine included in the first set sub-network or (ii) generated within the respective machine,

wherein determining the first set sub-network, determining the second set sub-network, and forwarding are performed when the respective machine is prepared to forward the packet to another machine.